Computer Science 304 Computer Organization Spring 2025 Assignment 7

Due: 11:59 p.m., Saturday, 4/12/25

For this project, write programs in C and Y86 that compute the following sum for different ranges:

$$\sum_{i=0}^{n} (7i-3)$$

where *n* = 0 to 10.

For the C program, you are only allowed to use addition and subtraction. Your solution should consist of one source file with two functions as listed below:

```
int summation (int n)
```

compute the summation of 7i - 3 using repeated adds (e.g., -3 + 7 - 3 + 7 + 7 - 3 for n = 2) (must be implemented as a nested loop)

main

loop through **n** from 0 to 10

call **summation** with **n** and save its return value print **n** in decimal; print **summation** return value on **n** in decimal and hex

The program can be compiled with the command: gcc summ.c -o summ

The Y86 assembly code should execute similarly to the C program; however, the summation results should be stored and viewed in an array declared at the end of the assembly code. As the program runs, store the results from **summation** in **array[0]** through **array[10]**. These values will be printed in hex at the end of execution and can be compared to those generated by the C program.

Do not make **summation** a formal subroutine (function) using calls and returns; instead, write it as a labeled part of the assembly program that performs the same operation as **summation** in the C program. Note that you will need a double nested loop (three loops total) to match the implementation from the C file. Do not take shortcuts by using intermediate results or closed-form expressions for the solution. Keep in mind that in Y86, you only have operations for add, subtract, AND, and XOR; though here, you should only need add and subtract. Be sure to use good programming practices in your code: comment (including a header) both your C and nearly every line of Y86 code for clarity, use mnemonic variable names, and format code with blank lines and indentation.

In your code, hardcode the upper value of **n** to 10. The TAs may change **n** to test other values.

The program should be assembled and executed with the commands:

yas summ.ys yis summ.yo

You should submit the following files on Blackboard:

summ.c summ.ys